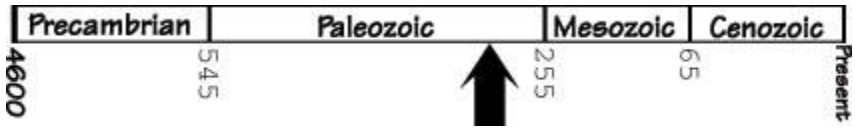
Rocks of the Blue Ridge & Piedmont: Region 1, con't

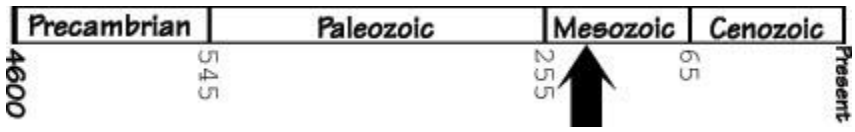
Pennsylvanian - Permian Rocks



During the late Pennsylvanian and Permian, Africa finally collided with North America during the Alleghanian mountain building event, forming the Appalachian Mountains and resulting in the formation of the supercontinent Pangea. The collision resulted in intense metamorphism of the Blue Ridge and inner Piedmont, more moderate metamorphism in the outer Piedmont, westward thrusting of the crust, and intrusions throughout the Blue Ridge and Piedmont region (similar to previous mountain building related intrusions) (Figure 2.22).

Figure 2.22: Igneous intrusions associated with the Alleghanian mountain-building event.

Triassic - Jurassic Rocks



During the late Triassic and early Jurassic, Pangea broke apart. Rifts formed in the crust along the margin of North America (as well as Africa and western Europe.) Blocks of crust slid down fault planes to form "rift" basins of varying sizes. The eroding cliffs of the fault blocks filled the basins with poorly sorted, red-colored sandstone and shale. These rift basin deposits are part of a sequence of rocks known as the Newark Supergroup, reaching up to 6 km thick in some places. These Triassic-Jurassic age deposits are found at the surface in the Southeast in Virginia and North Carolina (Figure 2.23). The rift basins expose characteristic reddish-brown sedimentary rock and igneous basalt or diabase, also known locally as "traprock". Periodically the basins were filled with water, forming shallow lakes in which were deposited thin, dark layers of sediment.

The rift valley igneous rocks were formed when magma pushed up through the fractures in the rifted crust. The magma either poured out on the surface of the basin as lava flows (basalt), or cooled and crystallized as igneous intrusions (diabase) before reaching the surface. The diabase formed at shallow depths within the crust because the relatively cooler temperatures of the upper crust forced the magma to cool quickly. North and South Carolina claim the largest diabase dike in the eastern United States, "the Great Diabase Dike", which extends across the border between the two states for 35 miles. The dike is more than 1000 feet wide in sections. Diabase dikes formed from the Triassic and Jurassic rifting period are found not only in the rift basins, but throughout the Piedmont.

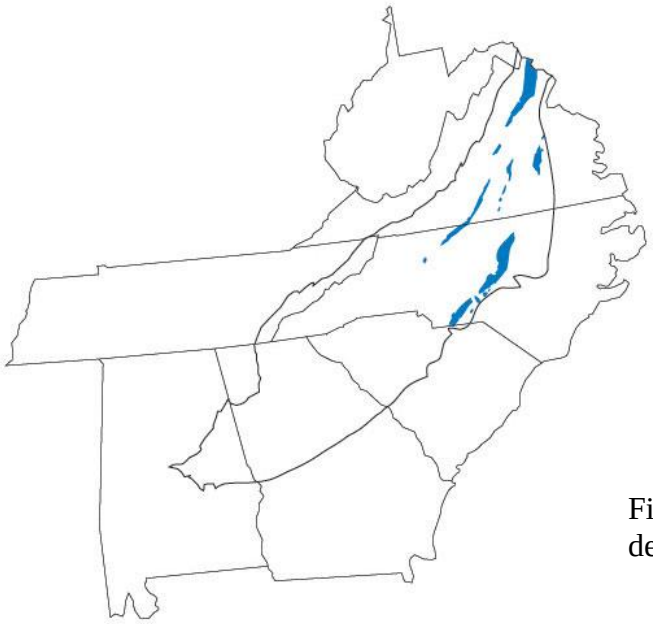


Figure 2.23: Triassic-Jurassic age deposits in the Southeast Piedmont.

Colors of Sedimentary Rocks: what do they tell us about the environment?

Color in rock may be an important indicator of environment in which the rock formed. The red-brown color so common in the rift basins of the Southeast results from iron within the rock that has been oxidized (rusted!) This is most common in sediments deposited in a seasonally hot and dry climate on land, where the iron could be exposed to the air and oxidized. Red sedimentary rock is also found in the Silurian rocks of the Inland Basins region, reflecting a time when ocean floor sediments were exposed above water and allowed to oxidize. In well-oxygenated, deep marine conditions, red clays may also form. In some marine environments, however, where iron is reduced rather than oxidized, rocks may take on a greenish hue. Likewise, some greenish sedimentary rocks may indicate the presence of the mineral glauconite, which is found only in marine environments.

In contrast, many shales are gray or black in color, reflecting the abundance of dark-colored carbon-rich organic material that can accumulate in quiet-water settings. The darker the shale, the more organic material that is preserved within! Shales are most commonly formed in quiet waters where tiny particles have time to settle out to the sea or lake floor. The presence of certain minerals may also affect the color and aid in the interpretation of the environment of deposition.

Picconi, J. E. 2003. The Teacher-Friendly Guide to the Geology of the Southeastern U.S. Paleontological Research Institution, Ithaca, NY.

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